

## Floristic Quality Assessment (FQA)

- What is FQA?
  - A method of assessing biological "integrity" or "condition" using the plant species occupying a site.





Alder Thicket

**Emergent Marsh** 

#### **COFCs or C-Values**

- Coefficients of Conservatism (C-Values or COFCs) make it possible to use plants as measures of site integrity.
- "On a scale of 0-10, how confident are we that a particular plant was taken from a remnant natural plant community?







C = 0

C = 5

C = 10

Increasing fidelity to an undisturbed, remnant plant community

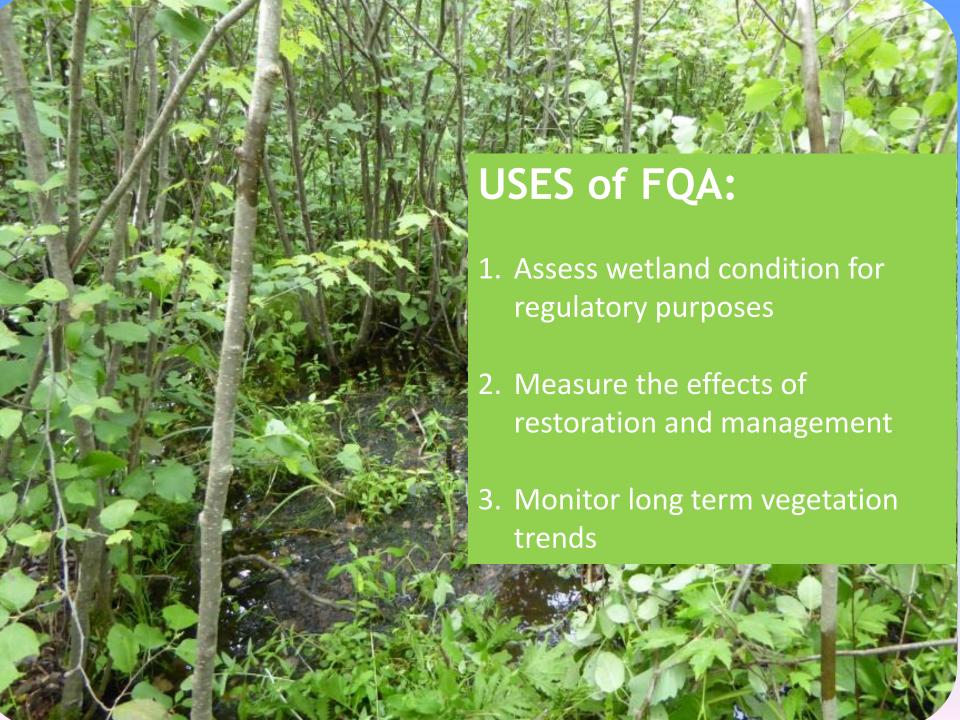
## **FQA Metrics**

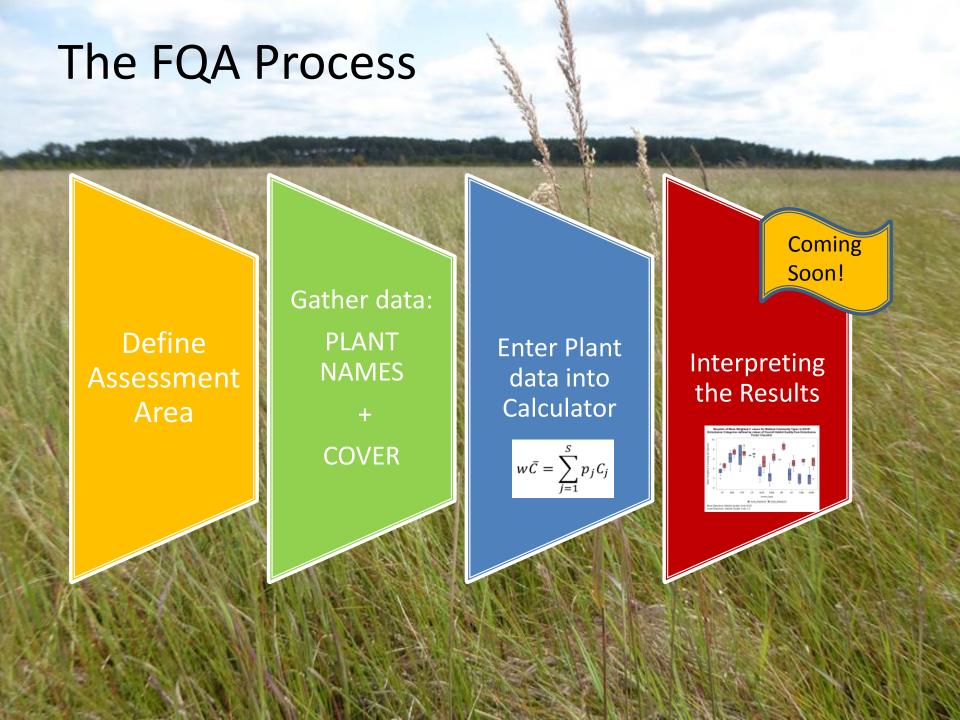
$$w\bar{C} = \sum_{j=1}^{S} p_j C_j$$

- Mean C
  - Native species only vs. all species
  - Weighted by abundance or unweighted

- Floristic Quality Index (FQI)
  - Native species only vs all species
  - Weighted by abundance or unweighted

$$FQI = \overline{C}\sqrt{N}$$

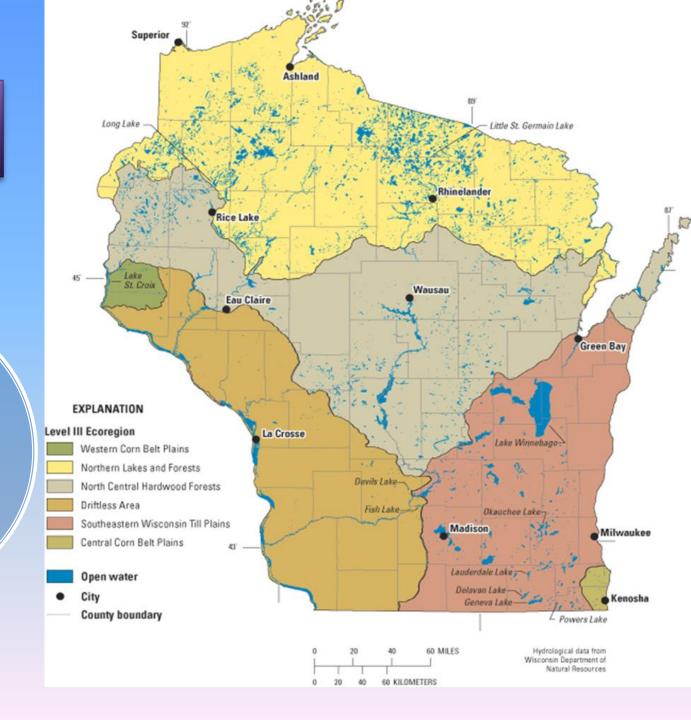




## WISCONSIN'S OMERNIK LEVEL III ECOREGIONS

#### **6 Regions:**

- Northern Lakes & Forests
- North Central Hardwood Forests + Western Corn Belt Plains
- Driftless Area
- Southeastern WI Till Plains
- + Central Corn Belt Plains



#### Wetland Assessment with FQA

Define

Assessment

Area

NHI Natural Wetland Communities

**Submergent Marsh** 

**Emergent Marsh** 

**Northern Sedge Meadow** 

**Southern Sedge Meadow** 

**Wet-mesic Prairie** 

**Calcareous Fen** 

**Boreal Rich Fen** 

**Central Poor Fen** 

**Ephemeral pond** 

**Open Bog** 

**Alder Thicket** 

**Shrub-carr** 

**Black Spruce Swamp** 

**Northern Wet-mesic Forest** 

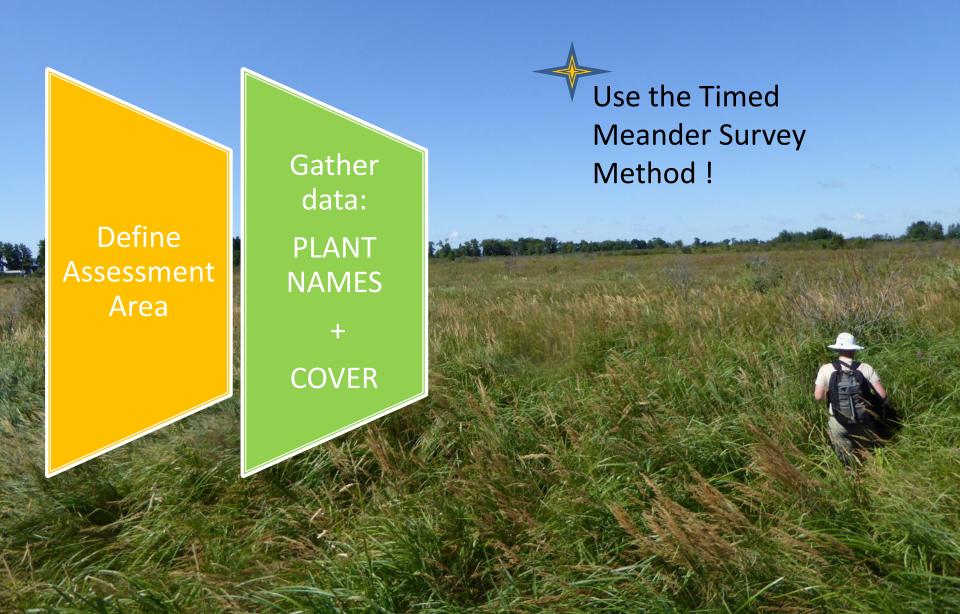
**Floodplain Forest** 

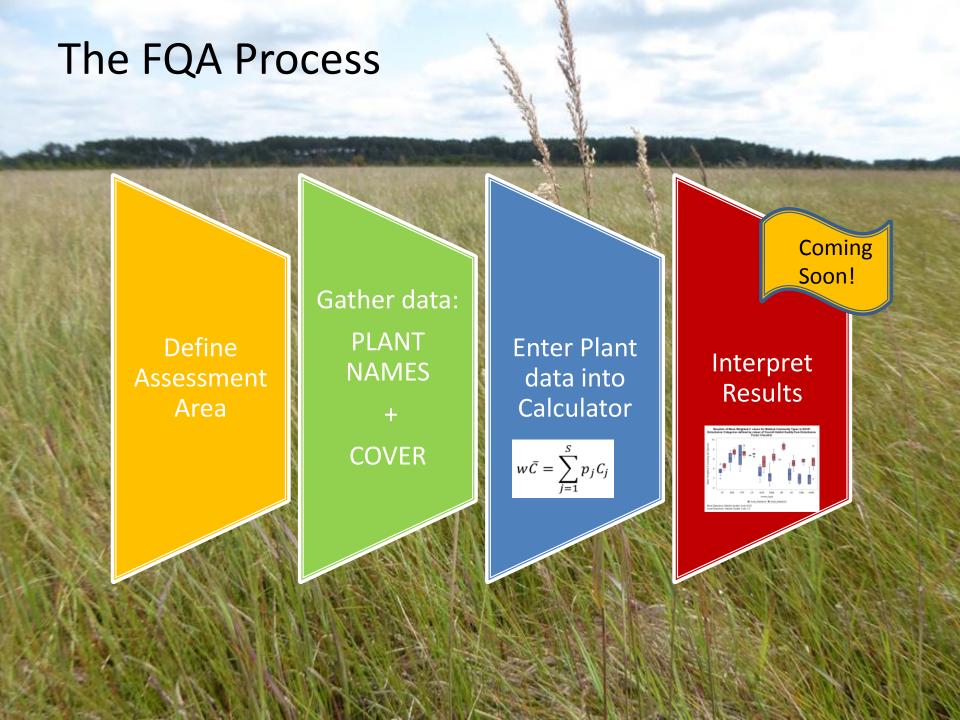
**Northern Hardwood Swamp** 

Muskeg



## The FQA Process





## The FQA Calculator

AA54

SITE NAME:

ECOREGION		North Central Hardwood Forests		Values				
COUN		Door County		<ul> <li>Returns 12 FQA metrics and a plant list.</li> </ul>				
REFER	RENCE MUNITY:	Northern Sedge Meadow		Excel- based format				
SURV	EYORS:	CLN, MCG						
SURV	EY DATE:	08/06/2015		Contains the Plant List for reference				
				<ul> <li>Can be used to evaluate any natural area in WI</li> </ul>				
				<ul> <li>Benchmarks are in develop</li> </ul>	oment			
				· ·				
	ENTER SPECIES CODE	ENTER % COVER:	Scientific Name	Common Name	COFC			
1	PHAARU	88	Phalaris arundinace	reed canary grass	0			
2	CARLAS	5	Carex lasiocarpa	narrow-leaved woolly s	redge 9			
3	CARPEL	4	Carex pellita	broad-leaved woolly se	dge 4			
4	SPAPEC	4	Spartina pectinata	prairie cord grass	5			
5	SIUSUA	3	Sium suave	hemlock water-parsnip	5			
6	PERAMP	2	Persicaria amphibia	water smartweed	5			
7	FRAPEN	1	Fraxinus pennsylvan	ica green ash, red ash	2			
8	LYCUNI	1	Lycopus uniflorus	northern water-horeho	und 4			
9	IRIVER	1	Iris versicolor	northern blue flag	5			

• Uses DNRs Plant Database for names and C-

# The plant database behind the calculator:

- First created in 2002 when C-Values were first assigned
- DNR-WQ; DNR –NHI; WIS

					A
ENTRY CODE	▼ WI Name	▼ Short Common Name ▼	COFC	▼ MW/NCN ▼ Spec_ID	<b>▼</b> Sp
ABIBAL	Abies balsamea	balsam fir	5	FACW/FAC 1715	17
ABUTHE	Abutilon theophrasti	velvet-leaf	0	FACU 1536	15
ACAGRA	Acalypha gracilens	short-stalk copper-leaf	0	FACU 5050	50
ACARHO	Acalypha rhomboidea	rhombic copper-leaf	0	FACU 1109	1.
ACEGIN	Acer ginnala	Amur maple	0	2	2
ACENEG	Acer negundo	box elder	0	FAC 3	3
ACENIG	Acer nigrum	black maple	5	FACU 4	4

# Features of DNR's Wisconsin Plant Database:

- Nomenclature follows the Wisconsin State Herbarium Checklist of Vascular Plants. See http://wisflora.herbarium.wisc.edu/
- Contains 4051 plant names, including:
  - All 2651 WI vascular plant species
  - 3667 accepted names, 484 synonyms

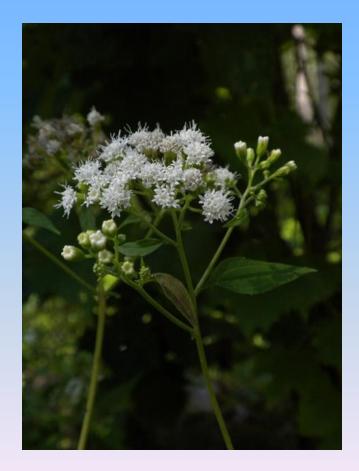


- Names are linked to ITIS (Integrated Taxonomic Information System)
- Additional maintained fields:
  - NR40 or Invasive species status,
  - DNR's Natural Heritage Inventory Working list of state sensitive species.
  - National Wetland Plant List Wetland Ratings.

## Entering Plant Data: Getting the Right Plant Name

- Use Wisconsin State Herbarium Nomenclature
- Helpful References:
  - http://wisflora.herbarium.wisc.edu
  - The FQA Calculator
  - Michigan Flora Online
  - Flora of North America

White Snakeroot
WIS name: <u>Ageratina altissima</u>



(Formerly Eupatorium rugosum)

**Glossy buckthorn** 

WIS name: Frangula alnus



(Formerly Rhamnus frangula)

#### Sandbar willow

WIS name: Salix interior



(Formerly Salix exigua)

#### **Enchanter's nightshade**

WIS name: Circaea canadensis



(Formerly Circaea lutetiana)

**Gray dogwood** 

WIS name: Cornus foemina



**Red-osier dogwood** 

WIS name:

Cornus sericea



NWPL name = Cornus racemosa (Formerly Cornus racemosa)

NWPL name = Cornus alba (Formerly Cornus stolonifera in WI)

Bog St. John's wort

Current name: *Triadenum fraseri* 



NWPL name = *Hypericum fraseri* 

**Glossy-leaved Aster** 

WI Name:

Symphyotrichum firmum



NWPL name = Symphyotrichum puniceum (NWPL lumps them, WI splits them)

# Entering Plant Names and Cover into the Calculator

ENTER	ENTER	
SPECIES	%	Scientific Name
CODE	<b>COVER:</b>	
ALNINC	78	Alnus incana
PHAARU	22	Phalaris arundinacea
IMPCAP	18	Impatiens capensis
PILPUM	11	Pilea pumila
AGEALT	10	Ageratina altissima
TOXVER	5	Toxicodendron vernix
URTDIO	5	Urtica dioica
BOECYL	4	Boehmeria cylindrica
SYMFOE	3	Symplocarpus foetidus



#### **RESULTS:**

Species Richness:
Total Species 65
# Native Species 61
# Non-Native Species 4
Proportion Non-Native Cover 12%

Floristic Quality Metrics: Native Species

Only

Unweighted Mean C ( $\overline{C}_{n}$ ) 4.7 Unweighted FQI<sub>n</sub> 36.7 Weighted Mean C (wC<sub>n</sub>) 3.9 Weighted FQI (wFQI<sub>n</sub>) 30.6

Floristic Quality Metrics: All Species

Unweighted Mean C<sub>a</sub> 4.4
Unweighted FQI<sub>a</sub> 35.6
Weighted Mean C (wC<sub>a</sub>)\*
Weighted FQI (wFQI<sub>a</sub>) 27.9

## **FQA RESULTS**



Weighted Mean C ( $w\overline{C}_a$ ) = 3.5

#### **RESULTS:**

Species Richness:
Total Species 25
# Native Species 19
# Non-Native Species 6
Proportion Non-Native Cover 34%

Floristic Quality Metrics: Native

Species Only

Unweighted Mean C ( $\overline{C}_n$ ) 5.1 Unweighted FQI<sub>n</sub> 22.0 Weighted Mean C (wC<sub>n</sub>) 6.0 Weighted FQI (wFQI<sub>n</sub>) 26.2

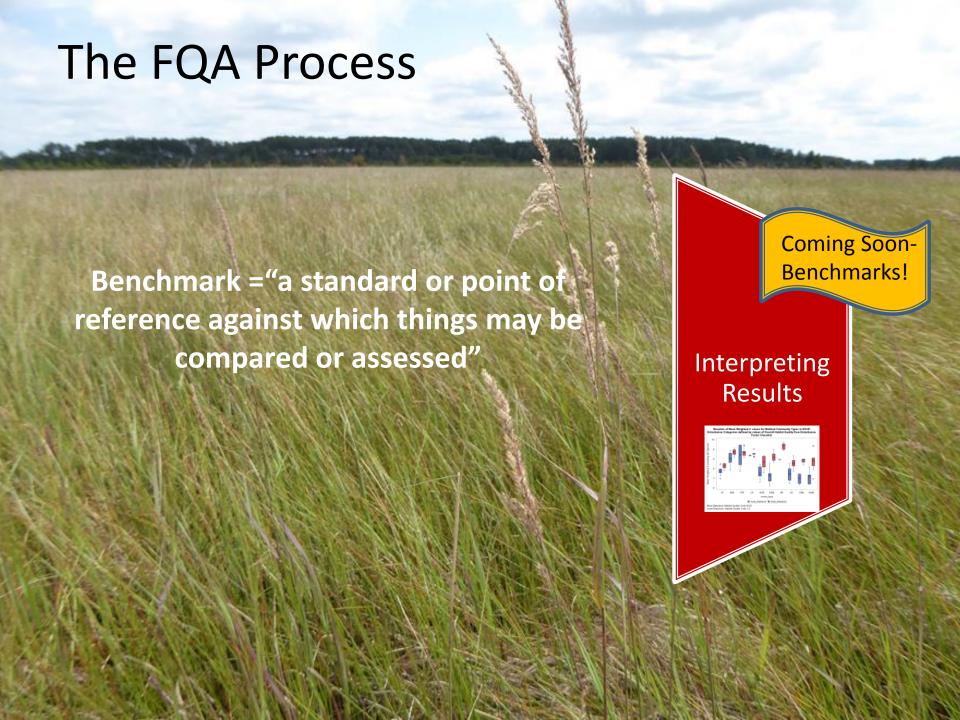
Floristic Quality Metrics: All Species Unweighted Mean  $C_a$  3.8 Unweighted  $FQI_a$  19.2 Weighted Mean C ( $wC_a$ )\* 4.0 Weighted FQI ( $wFQI_a$ ) 19.9

## FQA RESULTS



Weighted Mean C ( $w\overline{C}_a$ )

= 4.0

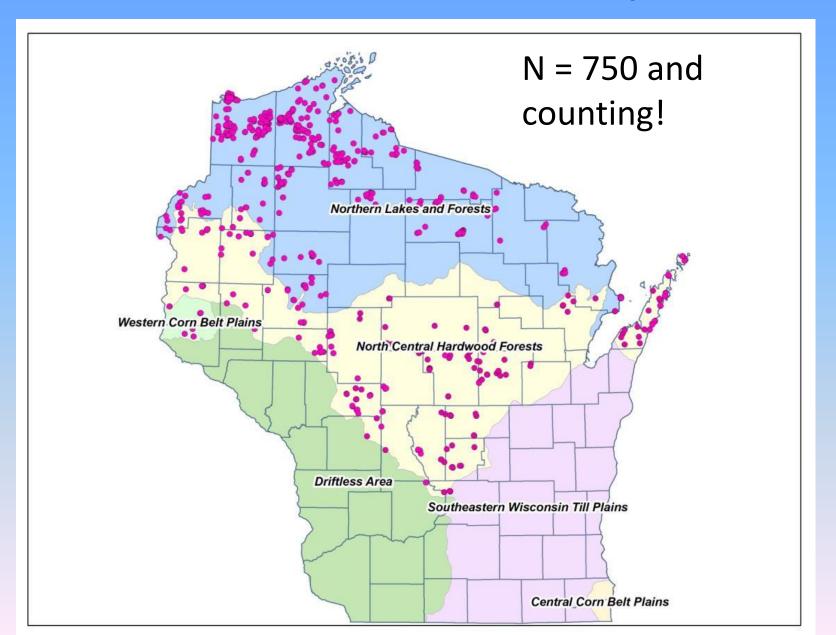


## **Benchmark Timetable**

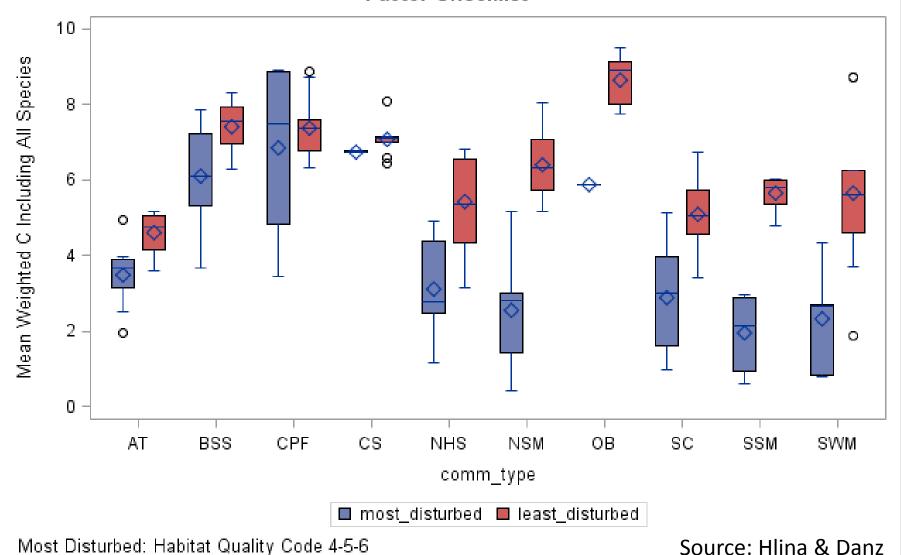


Year	Ecoregion	Survey Crew (sites)	Funding	
2014	Northern Lakes and Forests	UW Superior (120) Reference Wetlands (40)	EPA wetland grant	
2015	North Central Hardwood Forests	Project (140) Ref Wetlands (40)	EPA wetland grant	
2016	Driftless Area	Project (100) Ref Wetlands (20)	EPA wetland grant	
2017	Southeastern Wisconsin Till Plains	Project (140) Ref Wetlands (40)	EPA wetland grant	
2018	Wrap up Till Plains Conduct comprehensive data analysis	As needed	EPA wetland grant	

## Benchmark Surveys-



## Boxplots of Mean Weighted C values for Wetland Community Types in NCHF: Disturbance Categories defined by values of Overall Habitat Quality from Disturbance Factor Checklist



2016.

Least Disturbed: Habitat Quality Code 1-2

#### North Central Hardwood Forests Region Benchmarks

Condition Category:



Community Type

Preliminary Weighted Mean C Condition Benchmarks for sites from North Central Hardwood Forest and Western Corn Belt Plains (N= 224)

	Condition Category.				
	Excellent	Good	Fair	Poor	Very
					Poor
Alder Thicket	>5.0	4.2-5.9	3.9-4.2	3.2-3.9	<3.2
Cedar Swamp	>7.1	7.0-7.1	<7.0		
Northern Hardwood Forest	>6.5	4.4-	-6.5	2.5-4.2	<2.5
Northern Sedge Meadow	>7.1	5.7-7.1	3.0-5.7	1.4-3.0	<3.0
Open Bog	>7.7	6.2-7.7	<6.2		
Shrub Carr	>5.7	4.6-5.7	4.0-4.6	1.6-4.0	<1.6
Southern Sedge Meadow	>6.0	5.3-6.0	2.9-5.3	0.9-2.9	<0.9
Emergent Marsh	>6.2	4.6-6.2	2.7-4.6	0.8-2.7	<0.8



## Floristic Quality Assessment (FQA)

- What is FQA?
  - A method of assessing biological "integrity" or "condition" using the plant species occupying a site.



Alder Thicket:

mean wC = 3.5 = "Poor" condition



Emergent Marsh:

mean wC = 4.0 = "Fair" condition

